COMPARISON OF HEMODYNAMIC RESPONSES TO LARYNGOSCOPY AND INTUBATION USING McCOY AND MACINTOSH LARYNGOSCOPIC BLADES WITH OR WITHOUT FENTANYL

A STUDY OF 120 CASES

DISSERTATION SUBMITTED FOR THE DEGREE OF

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CERTIFICATE

This is to certify that this dissertation entitled **"COMPARISON OF THE HEMODYNAMIC RESPONSES TO LARYNGOSCOPY AND INTUBATION USING McCOY AND MACINTOSH BLADE WITH OR WITHOUT FENTANYL"** is a bonafide record of work done by Dr.C.PRASATH, under my guidance and supervision in the Department of Anaesthesiology, Madurai Medical College, Madurai, during the period of his postgraduate study for M.D., ANAESTHESIOLOGY from 2006 to 2009.

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DECLARATION

I, Dr.C.PRASATH solemnly declare that the dissertation titled**, "COMPARISON OF THE HEMODYNAMIC RESPONSES TO LARYNGOSCOPY AND INTUBATION USING McCOY AND MACINTOSH BLADE WITH OR WITHOUT FENTANYL"** has been prepared by me at Department of Anaesthesiology, Madurai Medical College, Madurai in partial fulfillment of the regulation for the award of M.D. Anaesthesiology degree examination of the TAMILNADU Dr.M.G.R MEDICAL UNIVERSITY. CHENNAI to be held in March 2009.

MADURAI

DATE :

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INTRODUCTION

The hemodynamic responses to laryngoscopy and endotracheal intubation have been recognized since 1951. Though these pressor responses have been observed frequently they have been interpreted differently by many authors. The induction of anaesthesia , laryngoscopy, endotracheal intubation and surgical stimulation often evoke cardiovascular response characterized by alterations in systemic blood pressure, heart rate and cardiac rhythm. The response following laryngoscopy and intubation peaks at 1 -2 min and returns to baseline within 5 -10 mins.

These sympathoadrenergic response are probably of little clinical consequence in healthy patients. Complications like left ventricular failure, myocardial ischemia and cerebral haemorrhage have been attributed to sudden rise in systemic arterial blood pressure and increase in heart rate. These complications are more likely to occur in patients with preexisting hypertension , coronary heart disease , cerebrovascular disease, intracranial pathology and hyperactive airways. In such cases, reflex circulatory responses such as increase in heart rate , systemic arterial blood pressure and disturbances in cardiac rhythm needs to be suppressed.

Prof. Ward and King (1960) in their combined study documented myocardial ischemic changes due to sympathoadrenal response immediately following laryngoscopy and endotracheal intubation with a mean increase in systemic pressure of 40 mm Hg even in normotensive patients.

Pyrs Roberts et al (1971) showed an exaggerated form of this response in hypertensives .Antihypertensives modify the response but do not inhibit it completely.

The hemodynamic response during laryngoscopy and endotracheal intubation should be abolished to balance the myocardial O2 supply and demand which is a keynote in the safe conduct of anaesthesia.

Attempt to reduce these untoward cardiovascular response during laryngoscopy and endotracheal intubation leads to the trial of various laryngoscopy blade and systemic as well as topical agents.

The present concept of a definitive sympathetic overactivity during laryngeal intubation clearly shows that a more protection against vagal overactivity and the use of anticholinergic drugs alone may not be sufficient.

Those techniques which require prior laryngoscopy to administer the local anesthetic solution are likely to be of limited value The common strategies adapted are narcotics, vasodilators , Betablockers, Calcium channel blockers, lidocaine , other sympatholytics, modification of instruments and use of other intubating devices (e.g. LMA) have been tried to obtund this haemodynamic response to laryngoscopy and intubation.

McCoy laryngoscope was introduced in 1993. It was postulated that it causes less mechanical stimulation of respiratory tract so haemodynamic response should be less.

In our study , we have compared the hemodynamic response of McCoy laryngoscopic blade and MACINTOSH laryngoscopic blade with or without fentanyl for laryngoscopy and intubation.

AIM OF THE STUDY

This study was done to compare the hemodynamic response to laryngoscopy and intubation using McCoy and Macintosh laryngoscopic blade with or without fentanyl.

ANATOMY

NERVE SUPPLY OF LARYNX

The nerve supply of the larynx is from Vagus via superior and Recurrent laryngeal nerve branches. Superior laryngeal nerve passes deep to both internal and external carotid arteries and there divides into a small external branch which supplies cricothyroid muscle and a large internal branch which supplies the interior of larynx as far down as the vocal cords after piercing the thyrohyoid membrane.

The Recurrent laryngeal nerve on the right side leaves the Vagus as the latter crosses right subclavian artery , it then loops under the artery and ascends to the larynx in the groove between oesophagus and trachea. On the left side the same originates from the Vagus as it crosses the aortic arch, then it passes under the arch to reach the groove between oesophagus and trachea. Once it reaches the neck the left nerve has the same relationship as on the right side. The recurrent laryngeal nerve provides the motor supply to the intrinsic muscles of the larynx except the cricothyroid . It also has a sensory branch which supplies laryngeal mucosa inferior to the vocal cords.

NERVE SUPPLY OF TRACHEA

The muscle fibres of the trachea , including trachealis muscle , are innervated by the recurrent laryngeal nerves which also carry sensory fibres from the mucous membrane.

Sympathetic nerve fibres are derived mainly from the middle cervical ganglion and have connections with the recurrent laryngeal nerve.

PHYSIOLOGIC AND PATHOPHYSIOLOGIC RESPONSE TO DIRECT LARYNGOSCOPY AND INTUBATION

Intubation of trachea alters respiratory and cardiovascular physiology both via, reflex response and by the physical presence of endotracheal tube . Although the reflex response are generally of shorter duration and of little consequence in the majority of patients, they may produce profound disturbance in patients with underlying abnormalities such as hypertension, coronary artery disease, reactive airways and intracranial neuro pathology

Cardiovascular responses:

The cardiovascular responses to laryngoscopy and intubation are bradycardia, tachycardia and hypertension. They are mediated by both the sympathetic and parasympathetic nervous system. Bradycardia is often seen in infants and small children during laryngoscopy and intubation. Although only rarely seen in adults, this reflex is mediated by an increase in vagal tone at the sinoatrial node is virtually a monosynaptic response to a noxious stimulus in the airway.

The more common response to endotracheal intubation is hypertension and tachycardia mediated by sympathetic efferents via the cardio accelerator nerves and sympathetic chain ganglia.

The polysynaptic nature of the pathways from the vagal and glossopharyngeal afferents to the sympathetic nervous system via the brainstem and spinal cord results in a diffuse autonomic response which includes widespread release of norepinephrine from adrenergic nerve terminals and secretion of epinephrine from the adrenal medulla. Some of the hypertensive response to endotracheal intubation also results from activation of renin angiotensin system ,with the release of renin from juxtaglomerular apparatus, an end organ innervated by beta adrenergic nerve terminals.

2. Central nervous system:

In addition to activation of the autonomic nervous system endotracheal intubation also stimulates CNS activity as evidenced by increasing EEG activities , CMRO2 and CBF.

3. Respiratory system :

The effects of endotracheal intubation on the pulmonary vasculature is probably less well understood than the response elicited in the systemic circulation.

AIRWAY – EFFECTS OF ENDOTRCHEAL INTUBATION

1. Upper Airway Reflex : Laryngospasm

Afferent pathway for laryngospasm and cardiovascular response to endotracheal intubation are mediated by the glossopharyngeal nerve , when stimuli occurs superior to the anterior surface of the epiglottis and by the vagus nerve when stimuli occur from the level of posterior epiglottis down into the lower airway.

Laryngospasm is a monosynaptic reflex primarily elicited under light general anaesthesia when vagally innervated nerve endings in the upper airway are stimulated and conscious respiratory efforts cannot override the reflex.

2. Dead space :

Normal extrathoracic anatomical dead space of 75 ml which on intubation reduced by 60 ml.

3.Upper Airway Resistance :

ETT causes a mechanical burden for a spontaneously breathing patient in the form of a fixed upper airway resistance because it decreases airway caliber and increases resistance to breathing.

4. Lower airway resistance :

Bronchospasm can occur. Reflex increase in airway resistance may occur . Receptors in the larynx and upper trachea may cause large airway constriction distal to the tube which in turn may extend to the smaller peripheral airways. Rapid changes in airway caliber following airway instrumentation are thought to result largely from parasympathetic activation of airway smooth muscle. Cholinergically induced bronchoconstriction is a normal airway response to intubation in anaesthetized patients.

5. ETT resistance and Exhalation :

ETT may limit expiratory flow so that full exhalation does not occur.

6. FRC :

Presence of endotracheal tube tends to reduce the FRC.

7.Cough :

Efficiency is reduced whenever an endotracheal tube is in place

8. When the upper airway is bypassed following intubation the gases must be warmed and humidified.

Intubation and cardiovascular diseases:

The most common adverse cardiovascular problem related to intubation is myocardial ischemia in patients with coronary insufficiency. Because two of the major determinants of O2 consumption namely HR and BP are markedly increased during intubation.

The integrity of cerebral and aortic aneurysms is largely a function of transmural pressure. Accordingly a sudden increase in blood pressure can lead to rupture of the vessels and sudden deterioration of the patients condition.

Intubation in neuropathological disorders can cause dangerous increase in intracranial pressure and transient impairment of cerebral perfusion.

Before the advent of neuromuscular blocking drugs, intubation was only performed under such deep levels of anaesthesia that there was relatively little cardiovascular response generated.

METHODS TO ATTENUATE CIRCULATORY RESPONSE DURING LARYNGOSCOPY AND INTUBATION :

The sympathoadrenal response should be abolished as maintenance of delicate balance between myocardial oxygen supply and demand forms the keynote in the safe conduct of anesthesia

Various methods tried to various workers are

I. Deepening of General Anaesthesia:

Inhalational anaesthetic agents—MAC . By increasing the dose of volatile agents required to block the cardiovascular response to endotracheal intubation. This deep level of anaesthesia achieved by inhalational agents results in profound cardiovascular depression prior to endotracheal intubation. Various agents used are Halothane, Isoflurane and Sevoflurane.

II. Lignocaine :

a) Lignocaine gargle for oropharyngeal anaesthesia.

b) Aerosol for intratracheal anaesthesia.

c) Topical spray for vocal cords.

d) Regional nerve blocks –superior laryngeal nerve, glossopharyngeal nerve.

e) Intravenous administration.

Topical anaesthesia of upper airway has proved to be less effective than systemic administration of lignocaine.

Mechanism:

1) By increasing the depth of general anaesthesia.
2) Potentiation of effects of nitrous oxide anaesthesia and reduction of MAC for halothane by 10 – 28 %.
3) Direct myocardial depression.
4) Peripheral vasodilatation.
5) Anti arrhythmic properties.
6) Suppression of cough reflex.

III vasodilators:

Hydralazine.

Sodium nitroprusside.

Nitroglycerin.

IV Narcotics :

Fentanyl.

Alfentanil.

Sufentanil.

Morphine.

Pethidine.

Fentanyl is most commonly used narcotic agents . It is a

a) Potent analgesic.

b) Has short duration of action.

c) Doesnot increase intracranial tension during controlled Ventilation.

d) Minimal circulatory changes.

<u>Mechanism :</u>

1. Analgesic effect of fentanyl suppress the nociceptive stimulation caused by the intubation procedure.
2. The centrally mediated decrease in sympathetic tone observed by

Lambie et al, (1974) when investigating the mechanism of hypotension induced by fentanyl in dogs, might partly be involved.

3. Activation of vagal tone by fentanyl was also observed.

V- Adrenergic Blockers :

Long acting : Metoprolol, Phentolomine

Propranolol, Labetolol.

Shorting acting : Esmolol.

Of these , Esmolol is most commonly used agents because of its ultra short action.

It reduces resting heart rate , systolic blood pressure , ejection fraction and cardiac index but it maintains coronary perfusion pressure.

VI – Calcium Channel Blockers:

Nifedipine.

Nicardipine.

Diltiazem.

Verapamil.

VII – Alpha 2 Agonist :

Clonidine – suppresses the increase in sympathetic activity evoked by Intubation.

VIII- Midazolam:

Sedation and anxiolytic.

IX – Magnesium sulphate

Sedation and anxiolytic.

X- McCOY Laryngoscopic blade

In McCOY blade the force exerted in levering the laryngoscopy in 50 % less than the conventional Macintosh blade .This results in reduction of hemodynamic stress during intubation.

XI – Gabapentin , Lornoxicam.

XII – Styletscope.

ENDOTRACHEAL INTUBATION

Vesalius in 1543 reported the first tracheal intubation in an animal. Trousseau reported 200 patients suffering from diphtheria who were saved by tracheostomy. In the early 1870's, Trendelenburg from Germany performed the first endotracheal anesthesia in man.

Endotracheal intubation for the purpose of providing anaesthesia was first described by William MacEwan in 1878 when he passed a tube from the mouth into the trachea,using fingers as a guide in the conscious patient. He isolated the trachea by packing the hypopharynx, from leaking of blood and debris.

Later, Rosenberg and Kuhn administered cocaine as local anesthetic to obtund the cough reflex during intubation

Edgar Rowbotham and Ivan Magill gained wide experience of endotracheal intubation during the first world war and popularized it subsequently.

Endotracheal intubation provides an artificial conduit between the atmosphere and the patient’s trachea for the purpose of alveolar gas exchange or protection of the lungs from extraneous substances.

In 1943, Robert (later Sir Robert) Reynolds Macintosh (clinical Professor of anesthesia, Nuffield Department of Anaesthetics, University of Oxford, Oxford, England) communicated an entirely new curved blade (incorporating a high vertical flange and a reversed horizontal flange facing to the left) for direct laryngoscopy.

The Macintosh laryngoscope was fashioned after a Boyle-Davis mouth gag. During a tonsillectomy in 1941, Macintosh was impressed by the way this mouth gag (a size larger than intended was used and obviously placed in the vallecula) indirectly elevated the epiglottis and exposed the laryngeal aperture.

COMPONENTS OF BLADE

Handle

1. Contains battery power source.

2. Fibreoptic scopes contain a fibreoptic bundle in the blade.

Blade

1. Base: attaches to handle

2. Tongue: usually perpendicular to the handle, can be either straight (for

placement posterior to the epiglottis) or curved (for anterior placement); most are interchangeable.

3. Web: contains electrical connections and bulb.

4. Flange: forms proximal third of the blade.

Flexible-tip blade:

There are a number of flexible tip blade that have hinged tip that is controlled by a lever attached to the proximal end of the blade.

When lever is pushed towards the handle , the tip of the blade is flexed. This will elevate the epiglottis to have a clear view of larynx.

Flexible-tip blades are available under various names including

McCOY,

Flipper,

Flex Tip,

Levering laryngoscope blade, and

Articulating laryngoscope blade.

McCOY :

McCoy was introduced in 1993

The McCoy provides the clinician with greater flexibility and improved control in a wide selection of difficult intubation cases such as:

1)Forward displacement of the Larynx.

2)Forward or prominent upper teeth.

3)Backward displacement of the tongue.

4)Decreased neck movement.

5) Cervical spine injuries.

6)Decreased mouth opening.

7)Recessive mandible.

8)Less force required.

9)Less trauma.

PHARMACOLOGY OF FENTANYL

Fentanyl is a synthetic narcotic agonist that is related to the phenyl piperidines. Acts at μ receptor as an agonist. Fentanyl when compared to morphine a prototype opioid as an analgesic is 80 -100 times more potent, has more rapid onset and shorter duration of action than morphine.

STRUCTURE:

Fentanyl is chemically identified as N-1(1-Phenylethyl-4) piperidyl propionanilidure citrate).

The empirical formula is C22 H28 N2 O C6 H8 O7.

AVAILABILITY:

Ampoules – 2ml containing 100 microgram (fendrop, fenstrong)

10 ml ampoules containing 50 μg per ml.

Lollipop for pediatric use.

Patches- transdermally delivering 75 -100 μg/hr.

ROUTES OF ADMINISTRATION:

Fentanyl is the only synthetic opioid available for various forms of administration.

Intramuscular

Intravenous

Neuraxial – Spinal, Epidural administration for intra and postoperative Analgesia.

Transdermal – applied before induction of anaesthesia and left in place for 24 hours. Reduces the amount of parenteral opioid requirement or post operative analgesia.

Transmucosal – To decrease anxiety and to facilitate induction of anaesthesia especially in children.

PHARMACODYNAMICS:

ACUTE EFFECTS :

CNS

Analgesia	Cough suppressant
Sedation	Miosis
Hypnosis	Nausea , vomiting ,
Euphoria	Skeletal muscle rigidity
Respiratory depressant	

CVS

Vasodilation

Bradycardia

Hypotension

OTHERS

SMOOTH MUSCLE SPASM

GIT,

Ureter,

Biliary tree,

Histamine release,

Decreases stress response,

CHRONIC EFFECTS:

Tolerance.

Physical dependence .

MECHANISM OF ACTION:

I – CNS EFFECTS :

1. Analgesia and mood effects :
   A. The processing of pain information is inhibited by a direct spinal effect of dorsal horn.
   B. Rostral transmission of pain signals is decreased by activation of descending inhibitory pathways in the brainstem.
   C. Emotional response to pain is altered by opioid actions in the

limbic cortex.

D. Acts at receptors located peripherally on sensory neurons.

2. Respiratory depression:

   a. Direct effect on respiratory centre in the medulla.

3. Nausea and vomiting :

   a. Stimulation of chemoreceptor trigger zone ,

   b. Interaction of dopaminergic , cholinergic or seratonergic mechanism.

4. Miosis :

   a. Stimulation of Edinger –Westphal nucleus of III rd nerve

5. Muscle rigidity :

   a. By acting at the receptor in the striatum, increases the rate of striatal dopaminergic biosynthesis and inhibits the release of the inhibitory neurotransmitter GABA.

II CARDIOVASCULAR SYSTEM:

a) Bradycardia : Stimulation of central vagal nucleus.

b) Peripheral vasodilation : Depression of vasomotor centre in Medulla.

c) Decreased central sympathetic tone : Raising the arrythmogenic threshold.

d) Hypotension : Especially in patients with elevated sympathetic tone like hypovolemia , cardiac failure.

III TOLERANCE :

a) Acute tolerance or tachyphylaxis,

b) Chronic tolerance,

c) Cross tolerance to other opioid agonist,

d) Develops most rapidly to depressant effects or opioids.

PHARMACOKINETICS:

Fentanyl administered IV has a rapid onset and shorter duration of action. The greater potency and rapid onset of action reflects the greater lipid solubility which facilitates its passage across the blood-brain barrier.

The short duration of action of a single dose of fentanyl reflects its rapid redistribution to inactive tissue sites such as fat and skeletal muscles, with an associated decrease in the plasma concentration of the drug. The lungs also serve as a large , inactive storage site, with an estimated 75 % of the initial fentanyl dose undergoing first pass pulmonary uptake.

Fentanyl is extensively metabolized by dealkylation, hydroxylation and amide hydrolysis to inactive metabolites , including norfentanyl and despropionyl norfentanyl that are excreted in bile and urine.

The pharmacokinetics of fentanyl can be described as three compartmental model with a distribution time of 1.7 minutes, redistribution of 13 minutes and a terminal elimination half time of 219 minutes. The volume of distribution is 4 L/Kg

ONSET TIME AND DURATION OF ACTION :

Route of administration	Onset time (mts)	Duration of action (hours)
IM	7 – 8	1 – 2
IV	Immediate	0.5 -1

CLINICAL USES :

As a narcotic analgesic during premedication, induction and maintenance of anaesthesia and in postoperative period as need arises.

To blunt the circulatory response to direct laryngoscopy for intubation and as an adjuvant to inhaled anaesthetics to prevent sudden changes in level of anaesthesia due to surgical stimulation.

As an anaesthetic agent with oxygen in high risk patients such as those undergoing open heart surgery or certain complicated neurological or orthopedic procedures.

As a neuroleptic anaesthetic agent with neuroleptic agents like Droperidol.

Neuraxially either alone or in combination with local anaesthetic to improve the quality of the blockade intraoperatively and for postoperative analgesia.

DOSAGE:

IM : 50 – 100 μg (1 -2 μg / kg)

IV : Low dose fentanyl 1 – 2 μg / kg (to provide analgesia)

2 – 20 μg / kg IV

Administered as an adjuvant to inhaled anaesthetic in an attempt to blunt circulatory response to direct laryngoscopy for intubation of the trachea or sudden changes in the level of surgical stimulation.

50 – 100 μg / kg IV (large dose of fentanyl)

To produce surgical anaesthesia

INTRA THECAL : 10 – 50 μg (0.25 – 0.5 μg / kg)

EPIDURAL : Bolus dosing - 1μg /kg

Continuous infusion after the bolus – 30 – 100 μg / hr

ORAL TRANSMUCOSAL FENTANYL : 15 – 20 μg / kg

TRANSDERMAL FENTANYL PATCH : 75 – 100 μg / kg

ADVERSE EFFECT:

a) Respiratory depression,

b) Rigidity,

c) Laryngospasm,

d) Apnoea,

e) Hypotension,

f) Bradycardia,

g) Dizziness,
h) Blurred vision,

i) Diaphoresis.

DRUG INTERACTION:

a) Nitrous oxide potentiates cardiovascular depression when high dose of fentanyl is administered.

b) Even relatively small dose of diazepam may cause cardiovascular depression when administered with high dose of fentanyl.

c) Fentanyl and tranquilizers can lead to hypotension.

d) Fentanyl and MAO inhibitors can lead to hypotension.

REVIEW OF LITERATURE

Though laryngoscopy and intubation were performed with ease in older years, the anaesthesiologists has to struggle to combat or subdue the circulatory or cardiovascular effects of the said procedure in patients with compromised circulatory system

Ried & Brace (1940) postulated that reflex circulatory responses to laryngeal instrumentation were modified through the vagus nerve and they named it as " vaso vagal reflex "

King et al (1951) used deep Ether anaesthesia to abolish the reflex circulatory response to tracheal intubation

King and his associates (1960) belived the reflex mechanisms to be essentially non specific in character. They stated that the impulse initiating the reflex arc are probably carried over the vagus , while the effector system is less clearly defined and may be due to decreased parasympathetic or increased sympathetic adrenal activity

Wycoff.C.C (1960) in his study stated that topical anaesthesia of the pharynx along with superior laryngeal blocks, reduced the increase in mean arterial pressure after intubation.

Forbes and Dally (1970) observed that laryngoscopy and endotracheal intubation is immediately associated with an average increase in mean arterial pressure of 25 mmHg in all 22 normotensive patients. These response were interpreted as due to reflex sympathetic adrenal stimulation.

Pry Robert et al (1971) found that the increase in heart rate and blood pressure are much more exaggerated in hypertensive patients.

Foex et al (1971) observed

I Inotropic Failure

II Ischemic arrhythmias and

III cerebrovascular accidents

In patients with uncontrolled hypertension who came up for emergency surgery and associated substantial increase in heart rate and blood pressure following laryngoscopy and endotracheal intubation which lasted for several minutes.

Denlinger.J.K and Ellison.N.E (1974) have used intratracheal lignocaine spray which causes 50 % reduction in hypertensive response.

Victoria Faria Balnc and Normand A.G (1974) in their article of "complication of tracheal intubation " have classified the neurogenic or reflexly mediated complication into three different categories.

a) LARYNGO VAGAL REFLXES –which give rise to spasm of the glottis , bronchospasm, apnoea, bradycardia, cardiac dysrhythmias and arterial hypotension. The mere presence of the tracheal tube seems to be the most common cause of bronchospasm in anesthetized asthmatic patients.

b) LARYNGO SYMPATHETIC REFLEXES – which includes tachycardia, tachyarrythmias, acute arterial hypertension as frequent complication .The hypertensive hyperdynamic state during laryngoscopy may be related in some cases to an increased noradrenaline fraction of the total catecholamines.

c) LARYNGO SPINAL REFLEXES – which include coughing , vomiting, and bucking

J.Curran , M.Crowley (1980) have studied the use of droperidol an alpha blocker to attenuate the pressor response . Droperidol administration was found to be associated with a desirably low mean arterial pressure for a short period in a proportion of patients.

Elliof et al (1980) by echocardiographic study found that there was substantial worsening of left ventricular function – akinesia, dyskinesia, or hypokinesia following laryngoscopy and endotracheal intubation.

Richard Mc Camman (1981) studied the effects or propranolol and they significantly proved that better protection was given by the administration to topical lignocaine or intravenous lignocaine in patients who were on chronic propranalol therapy.

James Hamil, Bedford and Auttin (1981) have proved that intravenous lignocaine suppresses the circulatory responses to laryngoscopy and endotracheal intubation.

Donal. E.Martin (1982) have also proved the efficacy of a low dose fentanyl along with an induction dose of thiopentone , but in these series , it was also found that the incidence and occurrence of tachycardia was not prevented.

V.M.Kavito (1982) studied attenuation of the circulatory response to laryngoscopy and intubation and showed fentanyl 6μg / kg completely abolished these response.

T.E Black, B.Kay AND T.E.J. Sleacy (1984) compared alfentanil with fentanyl in reducing the hemodynamic responses to laryngoscopy and intubation and found that no increase were noted in groups receiving 30 μg / kg of alfentanil or 5 μg / kg of fentanyl and alfentanil effect appears to have a shorter duration than that of fentanyl

B.Kay , T.E.J. Sleacy and P.M.Bolder (1985) compared fentanyl and nalbuphine in blocking the circulatory response to tracheal intubation and found that nalbuphine attenuated the mean pressure response to these maneuvers but had no effect in the accompanying tachycardia and fentanyl 5μg / kg prevents these response however at the cost of significant decrease in blood pressure and heart rate and respiratory depression.

Donal R.Miller and Raymond. J.Martinean (1989) used bolus dose of esmolol for treating hypertension, tachycardia and myocardial ischemia intraoperatively.

Castillo J, Castano J, Escolano F, Arilla M (1996) assess the cardiocirculatory repercussions of laryngoscopy performed with McCOY and Macintosh laryngoscope and concluded that McCOY laryngoscope was associated with significantly lower systolic arterial pressure and heart rate.

McCoy E.P, Mirakhur R.K, Rafferty C, Bunting.H, Austin B.A (1996) compared the forces exerted by McCOY and

Macintosh laryngoscope blade in 40 patients. The mean forces exerted was 10.1 N and 18.9 N and concluded that the use of McCOY blade results in significantly less force being applied during laryngoscopy. This may be the reason for the reduction in the stress response reported previously with the use of the McCOY blade.

McCoy E.P, Mirakhur.R.K, McCloskey B.V (1995) compared the cardiovascular changes and catecholamine concentration in 20 patients before and after laryngoscopy with either McCOY and Macintosh laryngoscope blade .They concluded that plasma catecholamine didn't rise in McCOY group and the stress response is less marked in McCOY blade.

Nishiyama T, Higashizawa T, Bito H, Konishi A, Sakai T (1997) compared the stress responses during laryngoscopy were compared among the situations using ,Miler, McCOY and Macintosh laryngoscope blade. Blood pressure , Heart rate, Plasma norepinephrine were measured. They concluded that Plasma norepinephrine after laryngoscopy in the McCOY group were lower than other two groups and stress response was least in McCOY group and maximum in Macintosh group.

Prabhat Tewari, D Gupta, A Kumar, U Singh (2005) compare the hemodynamic changes with McCoy *vs* Macintosh laryngoscope in 180 ASA I and II neurosurgical patients undergoing elective surgery .They concluded that McCoy laryngoscope blade is less stressful and fentanyl pretreatment is not necessary to attenuate haemodynamic responses with its use in ASA I and II patients.

S.K.Singhal and Neha (2008) compared hemodynamic response to laryngoscopy and intubation using McCOY and Macintosh laryngoscope and they concluded that McCOY laryngoscopy produces significantly less marked hemodynamic response.

MATERIALS AND METHODS

120 patients of ASA physical status I undergoing elective surgical procedure under general anaesthesia with endotracheal intubation were included in the study.

Patients belonging to age groups of 18 – 60 years of both sexes were included.

It is a prospective randomized controlled study. The study was conducted after getting approval by our institution ethical committee and after obtaining written informed consent from the patient. The surgeon was also duly informed of the study.

The study was done during the period from January 07 to December 07 in the department of anaesthesia, government Rajaji hospital, Madurai.

INCLUSION CRITERIA :

ASA I physical status.

EXCLUSION CRITERIA :

a) Patients with full stomach.

b) Patients posted for emergency surgery.

c) Patients with difficult airway.

d) Hypertension, Diabetes mellitus, Ischemic heart disease.

e) Patients with contraindication to drugs that are used.

f) Patients refusal.

MATERIALS:

1) Inj.thiopentone sodium 2.5%.

2) Inj. Vecuronium .

3) Inj. Fentanyl.

4) McCoy blade.

5) Macintosh blade.

6) Endotracheal tube of various size.

7) Multichannel monitor.

MONITORS:

1) Non invasive automated blood pressure.

2) ECG.

3) Pulse oximetry.

METHODS :

Patients of both sexes of ASA physical status I undergoing surgical procedure were randomly allocated into 4 groups

Group 1: McCoy laryngoscope with fentanyl pretreatment (McC+F).

Group 2: McCoy laryngoscope without fentanyl pretreatment (McC+NF).

Group 3: Macintosh laryngoscope with fentanyl pretreatment (Mk+F).

Group 4: Macintosh laryngoscope without fentanyl (Mk+NF)

PREOPERATIVE PREPARATION :

All the patients were admitted and they underwent routine investigations.

- Hb %
- Blood
  - Sugar
  - Urea
- Serum
  - Creatinine
  - electrolytes
- X ray chest
- ECG

Other investigations were obtained on the basis of condition of the patient.

ANAESTHESIA PROTOCOL :

Preoperative visit was done to allay anxiety and good rapport was established with the patients.

All patients were given preoperative night sedation with Tab.Diazepam 10 mg orally.

No premedication for all patients in the morning of surgery.

INDUCTION :

One of the anesthesiologists, who was blinded to the type of laryngoscope used gave all the drugs. This anesthesiologist was given an unmarked similar volume syringe, which either contained fentanyl or saline. Fentanyl pretreatment was done with 2 μg/kg, intravenously, in designated groups (Group 1 and Group 3) and same volume of saline was given in the no fentanyl group (Group 2 and Group 4). The drug was given 6 mins prior to the start of induction.

Another anaesthesiologist took note of the heart rate and blood pressure at different point of times (assessor blind). He was blinded for the drug and the device and he marked all the events on the trend graph of the monitor.

The third anesthesiologist who was blinded to the drugs and the haemodynamic parameters did the laryngoscopy and intubation. Laryngoscopy technique was standardized with the head lifted on a pillow in all the cases. Induction was done with priming dose of vecuronium bromide (0.015 mg/kg) followed with thiopentone sodium. At the loss of eyelash reflex rest of vecuronium bromide (total dose 0.1 mg/kg) was given to achieve muscle relaxation. The remaining dose of thiopentone sodium was given to the total dose (5 mg/Kg) according to the protocol. At this point nitrous oxide was added so as to make 60% inhaled mixture in oxygen. The laryngoscopy was done immediately after three minutes of induction.

The McCoy laryngoscope was used with full lever on and it was never used as Macintosh laryngoscope. Once the vocal cords were visualized, the intubation was done. Laryngoscopic and intubation time measured. No Cricoid pressure for all cases. If done case is excluded from study .

The laryngoscopy and intubation was done in single attempt and when ever more than one attempt was used or laryngeal pressure from outside was used, such patients were excluded.Endotracheal cuff was inflated with minimal leak.

MAINTENANCE:

Anaesthesia was maintained with controlled ventilation with Nitrous oxide 66 % and oxygen 33 %. No surgical simulation was permitted for 7 minutes after intubation.

MONITORING :

The heart rate (HR), systolic blood pressure (SBP), and the diastolic blood pressure (DBP) were noted at different time points- baseline, after induction, immediately after intubation, and subsequently at one-minute interval after intubation. Results were tabulated.

STATISTICAL TOOLS :

The information collected regarding all the selected cases were recorded in a Master Chart. Data analysis was done with the help of computer using Epidemiological Information Package (EPI 2002). Using this software, range, frequencies, percentages, means, standard deviations, chi square and 'p' values were calculated. Kruskul Wallis chi-square test was used to test the significance of difference between quantitative variables. A 'p' value less than 0.05 is taken to denote significant relationship.

OBSERVATION AND RESULTS

120 Patients under this study is categorized into 4 groups.They comprised of both sexes with age ranging from 18 – 60 years.

Group 1: consisting of 30 patients intubated with McCoy laryngoscope with fentanyl 2 μg /Kg 6 minutes prior to laryngoscopy (McC+F).

Group 2: consisting of 30 patients intubated with McCoy laryngoscope without fentanyl pretreatment and received equal volume of saline (McC+NF).

Group 3: consisting of 30 patients intubated with Macintosh laryngoscope with fentanyl 2 μg /Kg 6 minutes prior to laryngoscopy (Mk+F).

Group 4: : consisting of 30 patients intubated with Macintosh laryngoscope without fentanyl pretreatment and received equal volume of saline (Mk+NF)

RESULTS

Demographic profile of cases included in the study

Table 1 : AGE

Age group	Group A		Group B		Group C		Group D	
	No.	%	No.	%	No.	%	No.	%
Upto 20 years	4	13.3	3	10	1	3.3	-	-
21-30	2	6.7	5	16.7	5	16.7	4	13.3
31-40	14	46.7	12	40	14	46.7	19	63.3
41-50	9	30	6	20	9	30	7	23.3
Above 50	1	3.3	4	13.3	1	3.3	-	-
Total	30	100	30	100	30	100	30	100
Range Mean S.D.	18-54 35.7 9.1		18-55 36 10.5		19-53 36.1 7.0		26-49 36.5 6.0	
'p'	0.9993 Not Significant							

There is no significant difference in the age composition of the cases in the four groups

Table 2: sex

Sex	Group A		Group B		Group C		Group D	
	No.	%	No.	%	No.	%	No.	%
Male	15	50	12	40	14	46.7	15	50
Female	15	50	18	60	16	53.3	15	50
Total	30	100	30	100	30	100	30	100

The sex composition of the three groups are nearly identical

Table 3 : weight

Weight in kg	Group A	Group B	Group C	Group D
Mean	54.5	52.5	55	53.5
S.D	5.5	4.7	7.2	4.9
‘p’ significance	0.42346			

The mean weight of the three groups does not differ significantly

Table 4 : Time taken for laryngoscopy and intubation

Time	Group A	Group B	Group C	Group D
Mean	12.8	12.7	12.2	12.5
S.D	3.42	3.45	4	3.6
‘p’	0.4189			

The mean time for laryngoscopy and intubation does not differ significantly

Table 5

Heart rate , systolic blood pressure were recorded before induction, prelaryngoscopy, post intubation, and 1 min intervals for 7 min thereafter

Comparison of **preoperative** heart rate , blood pressure and mean arterial pressure at various time intervals in four groups

Basal rate	Group A		Group B		Group C		Group D		'p'
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	
Heart rate	82.1	7.3	83.4	7.8	80.1	6.7	79.9	6.6	0.1948 Not Significant
Systolic BP	121.6	8.7	120.2	10.5	116.9	11.3	117.1	9.9	0.0519 Not Significant
Diastolic BP	80.1	6.7	80.2	7	76.9	6.1	79.9	7.4	0.1988 Not Significant
MAP	93.9	6.5	93.5	7.3	90.2	6.8	92.3	8.3	0.0546 Significant

Table shows the preoperative mean Heart rate , mean systolic blood pressure , mean diastolic blood pressure , mean arterial pressure in groups A , B, C, D. There is no statistical difference in the mean heart rate, mean systolic blood pressure , mean diastolic blood pressure , mean arterial pressure in groups A , B, C, D.($p > 0.05$)

Table 6 : H.R, B.P and MAP Prelaryngoscopy

Prelaryngoscopy	Group A		Group B		Group C		Group D		'p'
	Mean	S.D	Mean	S.D.	Mean	S.D.	Mean	S.D	
Heart rate	83.6	7.9	85.8	8.1	81.1	6.4	85.2	7.4	0.0763 Not Significant
Systolic BP	121.5	7.8	121.4	8.6	117.7	7.1	119.4	7.0	0.2049 Not Significant
Diastolic BP	79.6	6.6	80.5	7.5	77.8	7	82.5	8.2	0.0502 Not Significant
MAP	93.6	6.7	94	5.9	89.8	4.9	94.8	7.8	0.0505 not Significant

Table shows the prelaryngoscopy Mean Heart rate , mean systolic blood pressure , mean diastolic blood pressure , mean arterial pressure in groups A , B, C, D.

There is no statistical difference in the mean heart rate, , mean systolic blood pressure , mean diastolic blood pressure , mean arterial pressure in groups A , B, C, D.($p > 0.05$)

Table 7 : H.R, B.P and MAP post intubation

Post intubation	Group A		Group B		Group C		Group D		'p'
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	
Heart rate	87.2	8.3	88.1	8.7	88.9	8.9	90.2	9	0.0014 Significant
Systolic BP	125	7.1	125.9	8.9	127.8	7.2	129.3	7.9	0.0233 Significant
Post intubation	82.5	6.8	82.3	7.5	79.1	5.4	85	7.6	0.0166 Significant
MAP	96.6	5.7	96.8	5.8	93.7	4.4	98.4	6.3	0.0273 Significant

Table shows the mean heart rate , mean systolic blood pressure , mean diastolic blood pressure , mean arterial pressure in groups A , B, C, D after intubation.

There is high statistical difference in mean heart rate across 4 groups ($p < 0.027$) .

Mean heart rate, blood pressure and mean arterial pressure changes are least with group A (intubation with McCoy laryngoscope with fentanyl pretreatment) and maximum with group D (macintosh laryngoscope without fentanyl pretreatment)

Table 8 : H.R, B.P and MAP at 1 min

post intubation	Group A		Group B		Group C		Group D		'p'
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	
Heart rate	9.7	1.9	10.9	2.3	13.6	3.4	20	3.8	0.0001 Significant
Systolic BP	131.8	6.2	132.8	7.3	137	7.6	141.7	4.9	0.0001 Significant
Diastolic BP	85.6	6.5	87.9	7.8	86.8	5.6	96.1	6.4	0.0001 Significant
MAP	101.3	5.2	102.8	5.6	103.6	4.8	111.3	5.1	0.0001 Significant

Table shows the Mean Heart rate , mean systolic blood pressure , mean diastolic blood pressure , mean arterial pressure in groups A , B, C, D. at 1 min. after intubation.

There is high statistical difference in mean heart rate across 4 groups (p < 0.001) .

Mean heart rate, blood pressure and mean arterial pressure changes are least with group A (intubation with McCoy laryngoscope with fentanyl pretreatment) and maximum with group D (macintosh laryngoscope without fentanyl pretreatment.

Patients who are intubated with McCoy laryngoscope with fentanyl pretreatment shows the lowest heart rate , BP than in any other group.

Table 9 : H.R, B.P and MAP at 2 minutes

Post intubation	Group A		Group B		Group C		Group D		‘p’
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	
Heart rate	90.5	7.7	92.4	8	92.3	5.8	99.5	6.6	0.0026 Significant
Systolic BP	130.8	6.9	131.2	7.7	134.9	7.8	139.3	5.3	0.0001 Significant
Diastolic BP	84.6	6.6	86.7	8.1	85.3	6	91.1	6.4	0.0001 Significant
MAP	100.3	5.4	101.6	5.8	101.8	5.2	109.2	5.2	0.0001 Significant

Table shows the Mean heart rate , mean systolic blood pressure , mean diastolic blood pressure , mean arterial pressure in groups A , B, C, D. at 2 minutes after intubation.

There is high statistical difference in mean heart rate across 4 groups ($p < 0.027$) .

Mean heart rate, blood pressure and mean arterial pressure changes are least with group A (intubation with McCoy laryngoscope with fentanyl pretreatment) and maximum with group D (macintosh laryngoscope without fentanyl pretreatment.

Table 10 : H.R, B.P and MAP at 5 minutes

Post intubation	Group A		Group B		Group C		Group D		‘p’
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	
Heart rate	86.6	7.8	88.3	9	85.4	6.5	90.4	5.7	0.0458 Significant
Systolic BP	126.9	7.3	127.7	8.5	128.9	7.3	130.1	6.8	0.0395 Significant
Diastolic BP	81.1	6.9	83	7.5	79.3	6.7	86.8	7.8	0.0022 Significant
MAP	96.4	5.7	98.6	5.7	95.5	5.6	101.2	6.2	0.0017 Significant

Table shows the Mean heart rate , mean systolic blood pressure , mean diastolic blood pressure , mean arterial pressure in groups A , B, C, D. at 5 minutes after intubation.

There is statistical difference in mean heart rate across 4 groups.

Mean heart rate, blood pressure and mean arterial pressure changes are least with group A (intubation with McCoy laryngoscope with fentanyl pretreatment) and maximum with group D (macintosh laryngoscope without fentanyl pretreatment .

The peak increase in heart rate , systolic blood pressure , diastolic blood pressure noticed during laryngoscopy and endotracheal intubation in all groups took 7 min to reach the pre induction value

Changes in the heart rate at various time intervals

Heart Rate	Group A		Group B		Group C		Group D		'p'
	Mean	S. D	Mean	S. D	Mean	S. D	Mean	S. D	
Baseline	82.1	7.3	83.4	7.8	80.1	6.7	79.9	6.6	0.1948 Not Significant
Pre aryngoscopy	83.6	7.9	85.8	8.1	81.1	6.4	85.2	7.4	0.0763 Not Significant
Post intubation	87.3	8.7	88.6	8.3	87	5.9	89.2	7	0.5914 Not Significant
At 1 minute	91.9	7.8	94.4	8	93.7	5.7	99.8	6.3	0.0003 Significant
At 2 minutes	90.5	7.7	92.4	8	92.3	5.8	99.5	6.6	0.0026 Significant
At 3 minutes	89.3	7.8	91.4	8.3	89.2	6.7	95.9	6.3	0.0016 Significant
At 4 minutes	87.9	7.7	89.5	8.6	86.9	6.3	93.6	6.2	0.0029 Significant
At 5 minutes	86.6	7.8	88.3	9	85.4	6.5	90.4	5.7	0.0458 Significant
At 6 minutes	84.8	7.6	86.7	9.3	83.5	6.5	87.8	5.9	0.1055 Not Significant
At 7 minutes	82.8	7.3	84.9	9.2	82.3	6.9	85.6	6	0.2544 Not Significant

Group A has 11. 9% increase in heart rate from basal value.

Group B has 13.2 % increase in heart rate from basal value.

Group C has 16.9 % increase in heart rate from basal value.

Group D has 24.9 % increase in heart rate from basal value.

Changes in the Systolic BP at various time intervals

Systolic B.P.	Group A		Group B		Group C		Group D		'p'
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D	
Baseline	121.6	8.7	120.2	10.5	116.9	11.3	117.1	9.9	0.0519 Not Significant
Pre laryngoscopy	121.5	7.8	121.4	8.6	117.7	7.1	119.4	7.0	0.2049 Not Significant
Post intubation	125	7.1	125.9	8.9	122.8	6.2	125.3	6.7	0.3533 Not Significant
At 1 minute	132.8	6.2	132.8	7.3	137	7.6	141.7	4.9	0.0001 Significant
At 2 minutes	131.8	6.9	131.2	7.7	134.9	7.8	139.3	5.3	0.0001 Significant
At 3 minutes	130.2	6	130.4	8.2	133.4	7.6	136.4	6.5	0.0027 Significant
At 4 minutes	128.7	6.9	128.1	8.5	131.1	7.3	133.2	6.5	0.0506 Not Significant
At 5 minutes	126.9	7.3	126.7	8.5	127.9	7.3	130.1	6.8	0.3195 Not Significant
At 6 minutes	125.6	7.4	124.9	8.6	124.8	6.9	126.6	6.7	0.7189 Not Significant
At 7 minutes	122.9	7.7	123.3	9.2	122.7	7.0	123.1	6.7	0.9548 Not Significant

Group A has 9.2 % increase in Systolic BP from basal value.

Group B has 10.48 % increase in Systolic BP from basal value.

Group C has 17.19 % increase in Systolic BP from basal value.

Group D has 21 % increase in Systolic BP from basal value.

Changes in the Diastolic BP at various time intervals

Diastolic B.P.	Group A		Group B		Group C		Group D		‘p’
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	
Baseline	80.1	6.7	80.2	7	76.9	6.1	79.9	7.4	0.1988 Not Significant
Pre laryngoscopy	79.6	6.6	80.5	7.5	77.8	7	82.5	8.2	0.0502 Not Significant
Post intubation	82.5	6.8	82.3	7.5	79.1	5.4	85	7.6	0.0166 Significant
At 1 minute	85.6	6.5	87.9	7.8	86.8	5.6	96.1	6.4	0.0001 Significant
At 2 minutes	84.6	6.6	86.7	8.1	85.3	6	91.1	6.4	0.0001 Significant
At 3 minutes	83	6.6	85.1	7.9	82.9	6.4	92.6	6.1	0.0001 Significant
At 4 minutes	82.3	6.3	83.9	7.6	81	6.4	88.5	8	0.000021 Significant
At 5 minutes	81.1	6.9	83	7.5	79.3	6.7	86.8	7.8	0.0022 Significant
At 6 minutes	79.7	6.8	82	7.8	77.6	6.4	84.7	7.8	0.0035 Significant
At 7 minutes	78.6	6.7	81.9	7.7	76.5	6.8	82.3	7.9	0.0067 Significant

Group A has 6.86 % increase in Diastolic BP from basal value.

Group B has 9.6 % increase in Diastolic BP from basal value.

Group C has 12.87 % increase in Diastolic BP from basal value.

Group D has 20.27 % increase in Diastolic BP from basal value.

DISCUSSION

Laryngoscopy and endotracheal intubation are known to cause increase in arterial blood pressure, heart rate and may be associated with various dysrhythmias. Since beginning there has been controversy regarding nervous pathway involved in this reflex response Reid and Brace attributed both afferent and efferent pathways to vagus nerve. King et.al observed that mechanism is non-specific, afferent being vagus but efferent pathway is less clear.

In view of the frequent occurrence of hypertension and tachycardia during laryngoscopy even in normotensive individuals, it is perhaps rather surprising that the complications have not been met very often . One reason for this may be the transient nature of hypertension which usually lasts less than 10 minutes.

It is possible however that some of the complications that occur during intubation or even later in the course of anaesthesia may be precipitated by an episode of hypertension and tachycardia, following endotracheal intubation. Elliof (1980) observed left ventricular wall dysfunction following endotracheal intubation.

This reflex sympathetic response may be diminished or modified locally , centrally and peripherally and the attempts have been made to accomplish this using all these approaches with varying success.

Methods may be many but obtunding this reflex response during laryngoscopy and intubation remains a major concern for the anesthesiologists.

Deep anaesthesia, topical anaesthesia, opioids, calcium channel blockers, beta blockers, laryngeal mask airway (LMA) have been tried with varying success.

King et al (1951) used ether , **Wychoff et al** (1960) and **J.Kenneth** (1974) tried a combination of topical anaesthesia of larynx together with superior laryngeal nerve block to attenuate the stress response to endotracheal intubation.

Steinhan and Gaskin (1963) used intravenous lignocaine, **James et al** (1981) used lignocaine intratracheal spray , **Masson and Eckangoff** (1971) **and Denlinger J.K** (1974) and **Stoelting** (1978) used a combination of viscous lignocaine and topical lignocaine and in 1979 **Leako** used a bolus of sodium nitroprusside.

J.Curran et al (1980) tried droperidol, **A.J Cole and C.Jordan** (1980) and **Richard et al** (1981) studied the effect of fentanyl in attenuating the intubation stress response.

Inhalational agents when used required deep levels and may delay recovery after short surgeries and can cause cardiovascular depression.

Adrenergic blockers are effective but may outlast the transient intubation response and may cause profound hypotension and bradycardia. Sudden withdrawal may results in rebound hypertension.

Use of vasodilators like sodium nitroprusside results in reflex tachycardia, lability in blood pressure , cerebral Vasodilation with elevation of intracranial pressure and pulmonary venous admixture.

It has been observed that amount of forces exerted during laryngoscopy and intubation is the key determinant for mechanical stimulation of stretch receptors present in the respiratory tract. Thus use of different types of laryngoscope blades can help decreasing this response.

McCoy was introduced in 1993; It decreases the amount of forces exerted during laryngoscopy and endotracheal intubation so the exaggerated reflex haemodynamic response is significantly reduced.

Laryngoscopy with McCoy blade required only 53% of the force (10.1 N) in order to obtain a clear view of vocal cord as compared to Macintosh blade (18.9 N). The reason could be the hinged tip elevates the epiglottis rather than forward displacement of the attached structures by curved blade**. [McCoy EP, Mirakhur RK, McCloskey BV. A comparison of the stress response to laryngoscopy. The Macintosh versus the McCoy blade. Anaesthesia 1995; 50: 943–6]**

Increase in plasma noradrenaline level with use of Macintosh blade and absence of significant change in plasma noradrenaline level with the McCoy blade is again a reflection of very less pressure response and tachycardia after laryngoscopy. A positive correlation has been demonstrated between force exerted at laryngoscopy and patient's height, weight, body mass index (BMI) and presence of maxillary incisors but it was seen that effect of these factors on force exerted with the McCoy blade is not as important as with Macintosh blade.

So this study was done to compare the hemodynamic response to laryngoscopy and intubation using McCoy and Macintosh laryngoscope and use of fentanyl in stress attenuation.

Laryngoscopy and intubation times were comparable in all 4 groups in our study.

Stress response were less when McCoy laryngoscope is used for intubation then in Macintosh laryngoscope.In our study we observed the maximum increase in heart rate from the baseline after laryngoscopy in group D [macintosh without fentanyl] and McCoy with fentanyl produces a least rise in heart rate from base line. Group A has 11. 9% increase in heart rate from basal value. Group B has 13.2 % increase in heart rate from basal value. Group C has 16.9 % increase in heart rate from basal value. Group D has 24.9 % increase in heart rate from basal value.

Moreover laryngoscopy with McCoy blade with or without fentanyl produces significantly a less rise in all hemodynamic parameters than with Macintosh blade with fentanyl.In all groups laryngoscopy and intubation response peaks one minute after intubation. Group A has 9.2 % increase in Systolic BP from basal value Group B has 10.48 % increase in Systolic BP from basal value Group C has 17.19 % increase in Systolic BP from basal value Group D has 21 % increase in Systolic BP from basal value.

Rise in diastolic BP after intubation was also less in group A than in any other groups. Group A has 6.86 % increase in Diastolic BP from basal value.Group B has 9.6 % increase in Diastolic BP from basal value.Group C has 12.87 % increase in Diastolic BP from basal value. Group D has 20.27 % increase in Diastolic BP from basal value.

This confers with the following studies :

The Macintosh versus the McCoy blade. Anaesthesia 1995; 50: 943–6

In 1995 McCOY et al who concluded that the stress response to laryngoscopy is less marked with the use of the McCoy blade and is probably due to a reduction in the force necessary to obtain a clear view of the larynx. Rise in Plasma adrenaline after laryngoscopy was not observed in laryngoscopy with McCoy blade

Rev Esp Anestesiol Reanim. 1996 Jun-Jul;43(6):219-21.

[Cardio-circulatory response to laryngoscopy. Comparative study between Macintosh and McCoy laryngoscopes]

Castillo J, Castano J, Escolano F, Arilla M (1996) assess the cardiocirculatory repercussions of laryngoscopy performed with McCOY and Macintosh laryngoscope in 58 patients and concluded that McCOY laryngoscope was associated with significantly lower systolic arterial pressure and heart rate.

Which laryngoscope is the most stressful in laryngoscopy;Macintosh, Miller or McCoy? (Japanese). Masui 1997; 46: 1519–24.

Nishiyama T, Higashizawa T, Bito H, Konishi A, Sakai T, (1997) who concluded that Plasma epinephrine after laryngoscopy in the McCOY group were lower than other two groups and stress response was least in McCOY group and maximum in Macintosh group.

Opioid sparing during endotracheal intubation using mccoy laryngoscope in neurosurgical patients: The comparison of haemodynamic

changes with macintosh blade in a randomized trial. J Postgrad Med 2005;51:260-4

Prabhat Tewari et al (2005) compare the hemodynamic changes with McCoy vs Macintosh laryngoscope in 180 ASA I and II neurosurgical patients undergoing elective surgery . They found that McCoy laryngoscope blade is less stressful and with fentanyl pretreatment the stress response is least than with Macintosh blade with fentanyl treatment.

Haemodynamic Response To Laryngoscopy And Intubation: Comparison Of McCoy And Macintosh Laryngoscope: The Internet Journal of Anesthesiology. 2008; Volume 17, Number 1.

S.K.Singhal and Neha (2008) compared hemodynamic response to laryngoscopy and intubation using McCOY and Macintosh laryngoscope and they concluded that McCOY laryngoscopy produces siginificantly less marked hemodynamic response.They also concluded that this nonpharmacological intervention can be an adjuvant to attenuate the stress response during laryngoscopy and intubation along with other pharmacological agents.

In our study the mean laryngoscopy and intubation time in all four groups were below 13 seconds and are comparable . and it has been found that laryngoscopy time less than 14 seconds is desirable to reduce the amount of stress significantly.[Stoelting coexisting disease] and all intubation where done in first attempt without cricoid pressure.

SUMMARY

This study is done to compare the hemodynamic changes with McCoy laryngoscope and Macintosh laryngoscope in 120 patients who were divided into 4 groups :

Group 1: McCoy laryngoscope with fentanyl pretreatment (McC+F).

Group 2: McCoy laryngoscope without fentanyl pretreatment (McC+NF).

Group 3: Macintosh laryngoscope with fentanyl pretreatment (Mk+F).

Group 4: Macintosh laryngoscope without fentanyl (Mk+NF)

Intubation with McCoy blade along with use of fentanyl 6 minutes before intubation provided a least rise in mean heart rate , mean systolic blood pressure , mean diastolic blood pressure and mean arterial blood pressure.

Intubation with McCoy blade without fentanyl also produces a lesser rise in hemodynamic parameters but not as least as group A

Intubation with Macintosh blade even with fentanyl pretreatment produces a significant stress response when compared with groups A ,B.

Finally Intubation with Macintosh blade without fentanyl pretreatment produces maximum stress response when compared with anyother groups.

Thus McCoy laryngoscope produces significantly less rise in haemodynamic parameters as compared to Macintosh laryngoscope during laryngoscopy and intubation. It can be utilized as an additional tool along with\ pharmacological interventions for obtunding this reflex response.

CONCLUSION

McCOY laryngoscope produces significantly less rise in hemodynamic parameters when compared with Macintosh blade. The combination of McCOY laryngoscope with fentanyl produces the least response than with Macintosh with fentanyl.

So this nonpharmacological intervention of McCOY blade can be utilized as a tool along with pharmacological drug fentanyl , for obtunding hemodynamic responses to laryngoscopy and intubation

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PROFORMA

COMPARISION OF HEMODYNAMIC CHANGES OF MACINTOSH AND McCoy BLADE WITH OR WITHOUT FENTANYL

NAME: AGE/SEX:

IP No: WARD: UNIT: WEIGHT :

HEIGHT :

DIAGNOSIS:

PROCEDURE:

PREOP:

BP: PR: CVS : RS : AIRWAY :

Investigations:

ANY MEDICAL ILLNESS:

GROUP:

A--- McCOY AND FENTANYL

B--- McCOY WITHOUT FENTANYL

C--- MACINTOSH AND FENTANYL

D--- MACINTOSH WITHOUT FENTANYL

DOSE:

Inj.FENTANYL 2 μg/kg IV

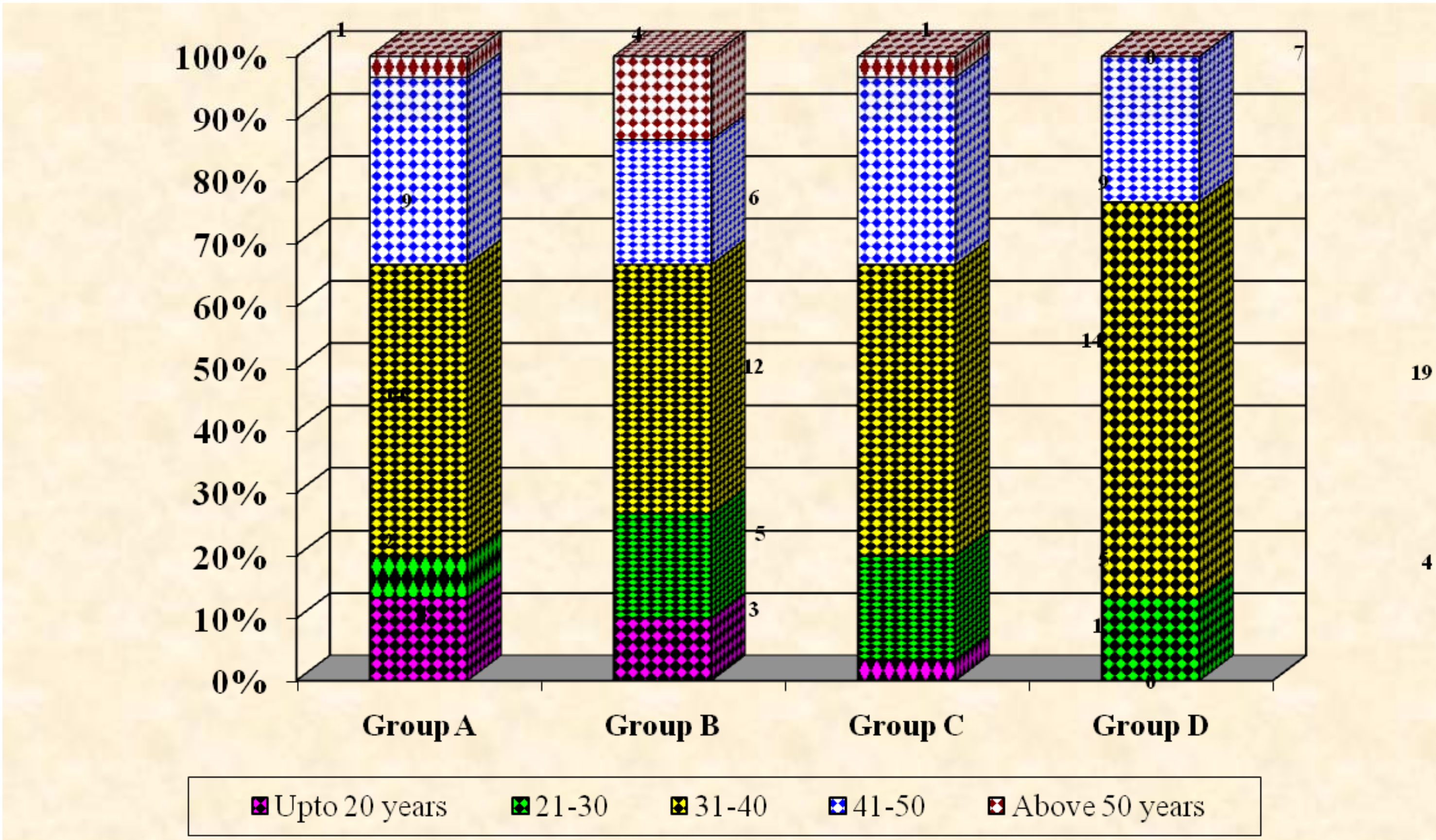
Inj.VECURONIUM 100 μg /kg IV

LARYNGOSCOPY & INTUBATION TIME:

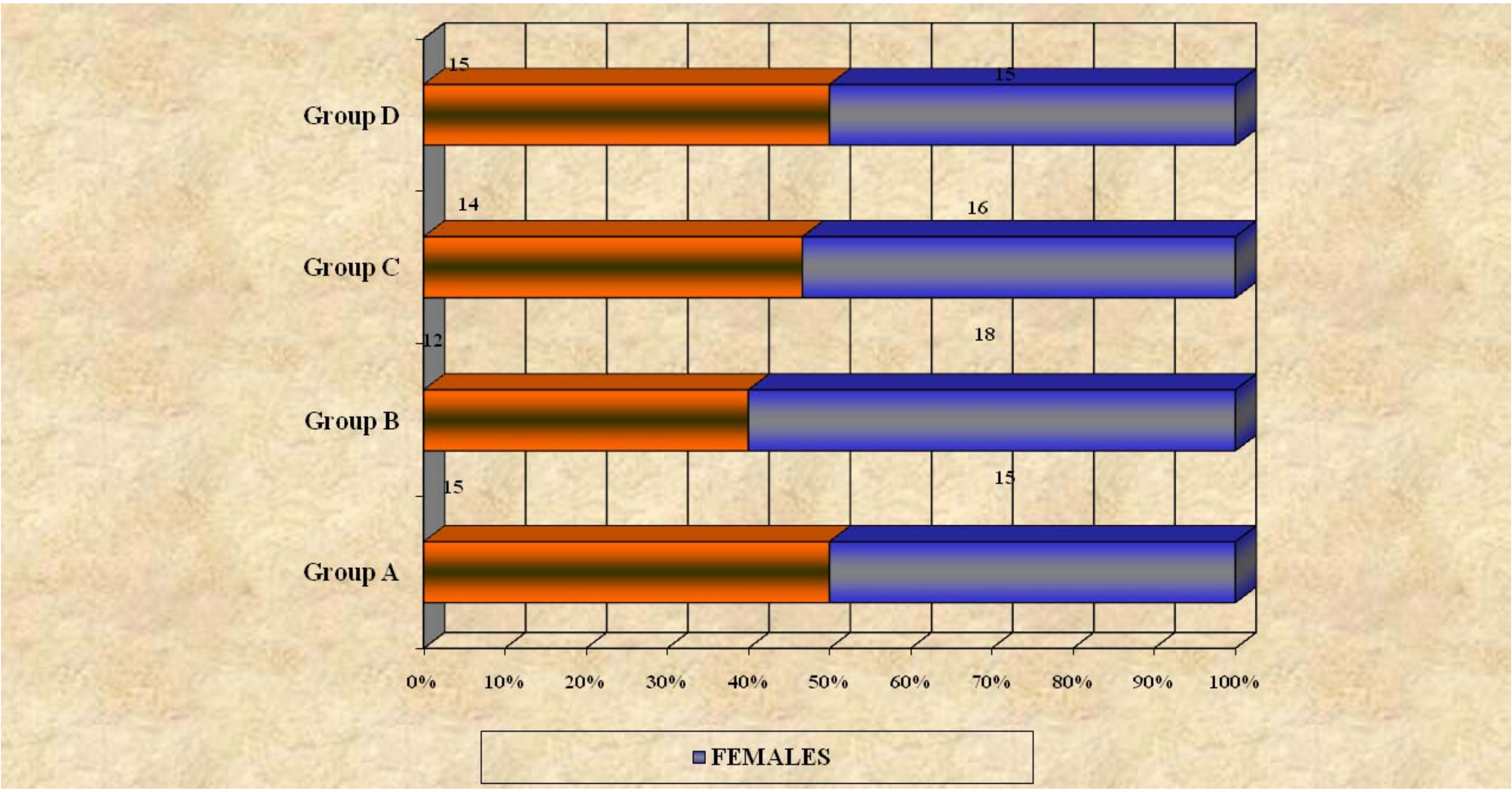
CRICOID PRESSURE:

PARAMETER TIME	PR	SBP	DBP	MAP
BASELINE				
PRELARYNGOSCOPY				
POSTINTUBATION				
1 MIN				
2 MIN				
3 MIN				
4 MIN				
5 MIN				
6 MIN				
7 MIN				

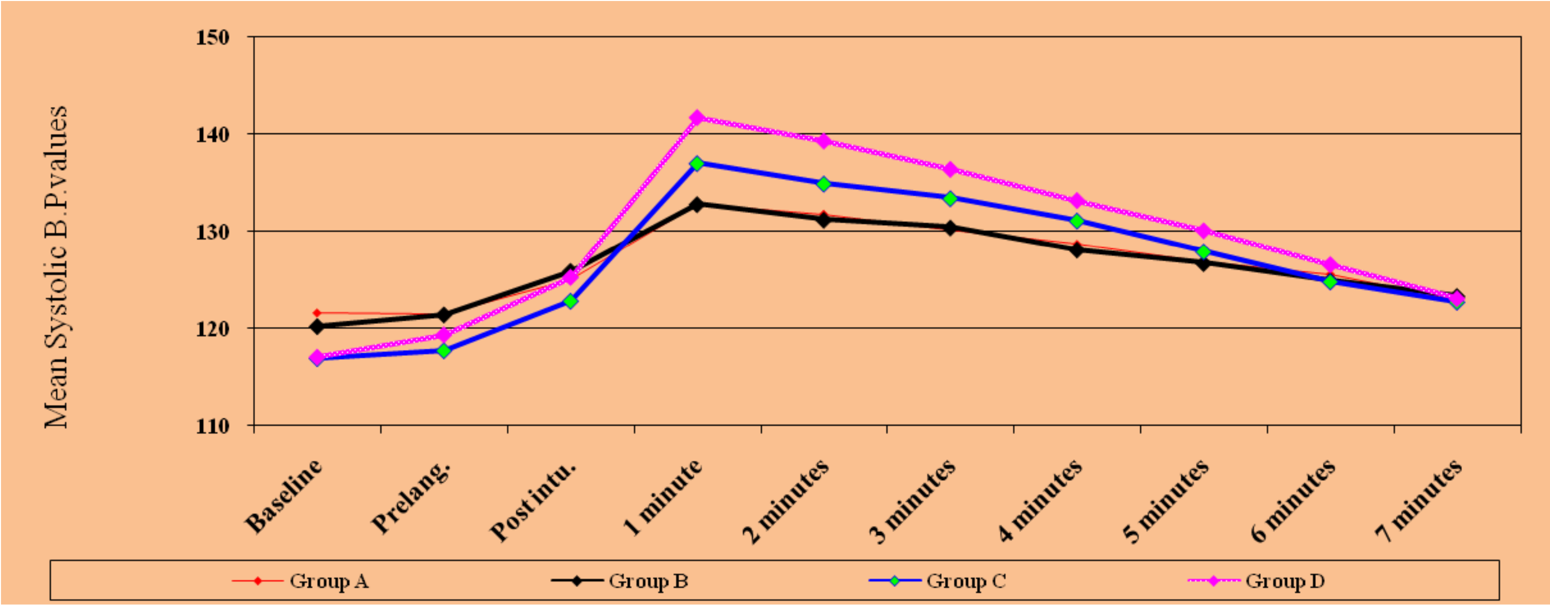
AGE DISTRIBUTION



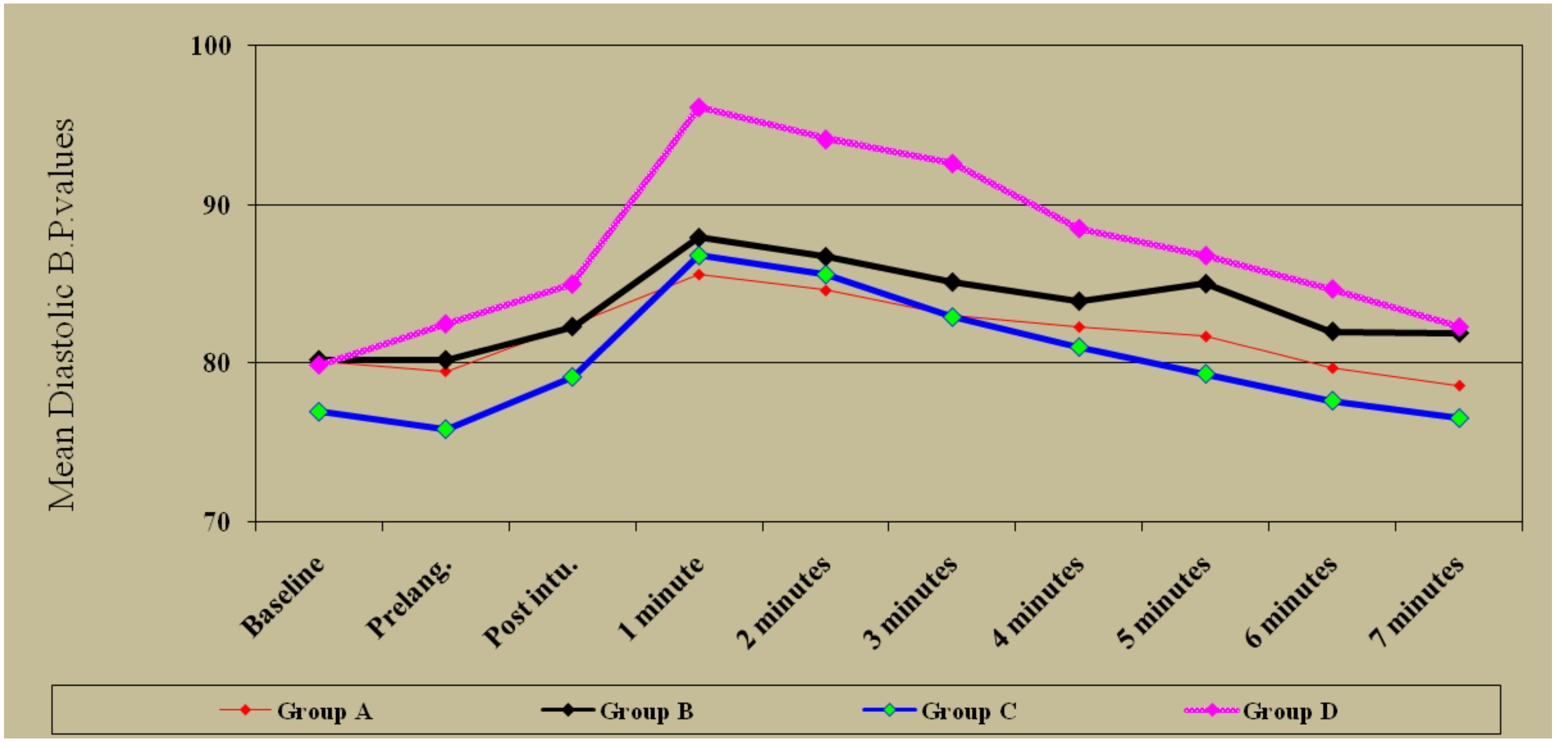
SEX DISTRIBUTION



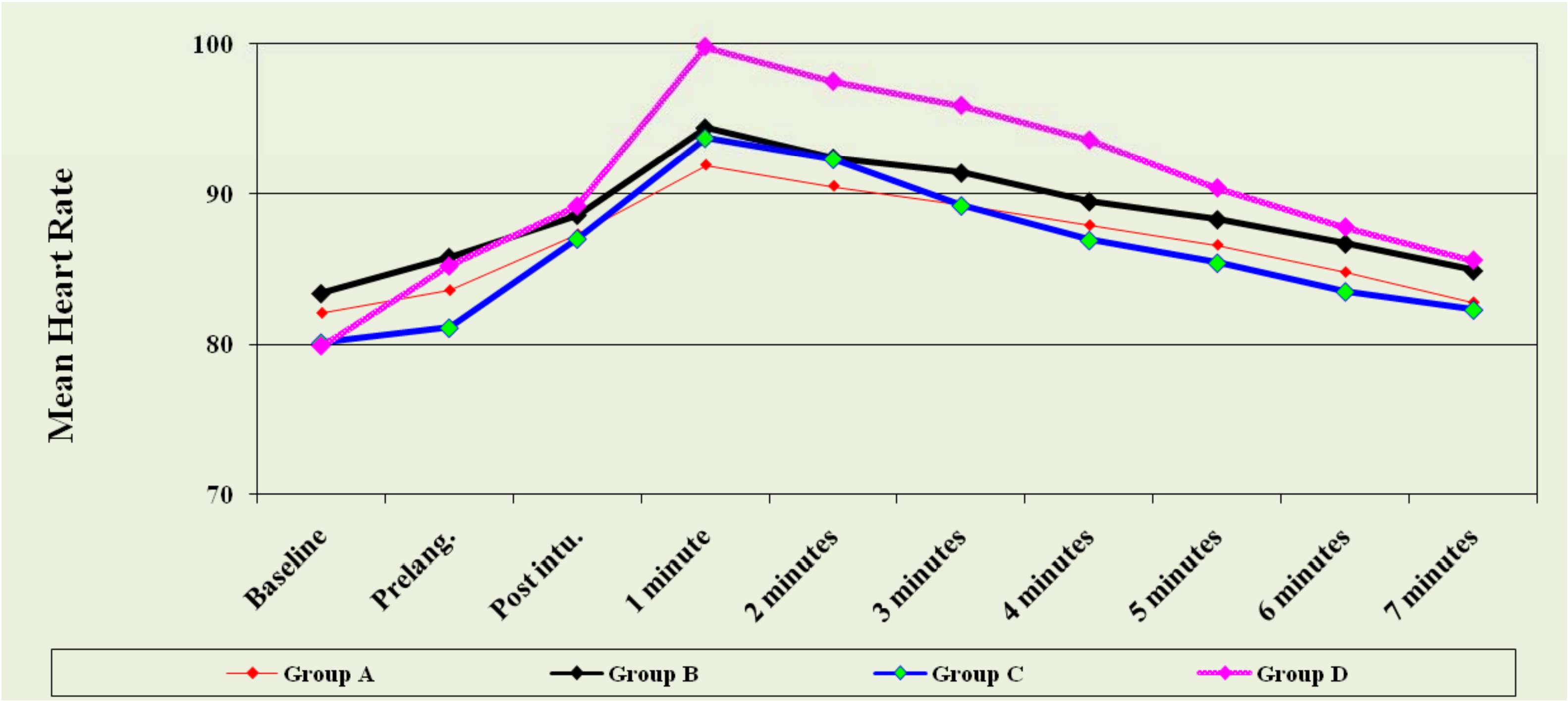
SYSTOLIC BLOOD PRESSURE



DIASTOLIC BLOOD PRESSURE

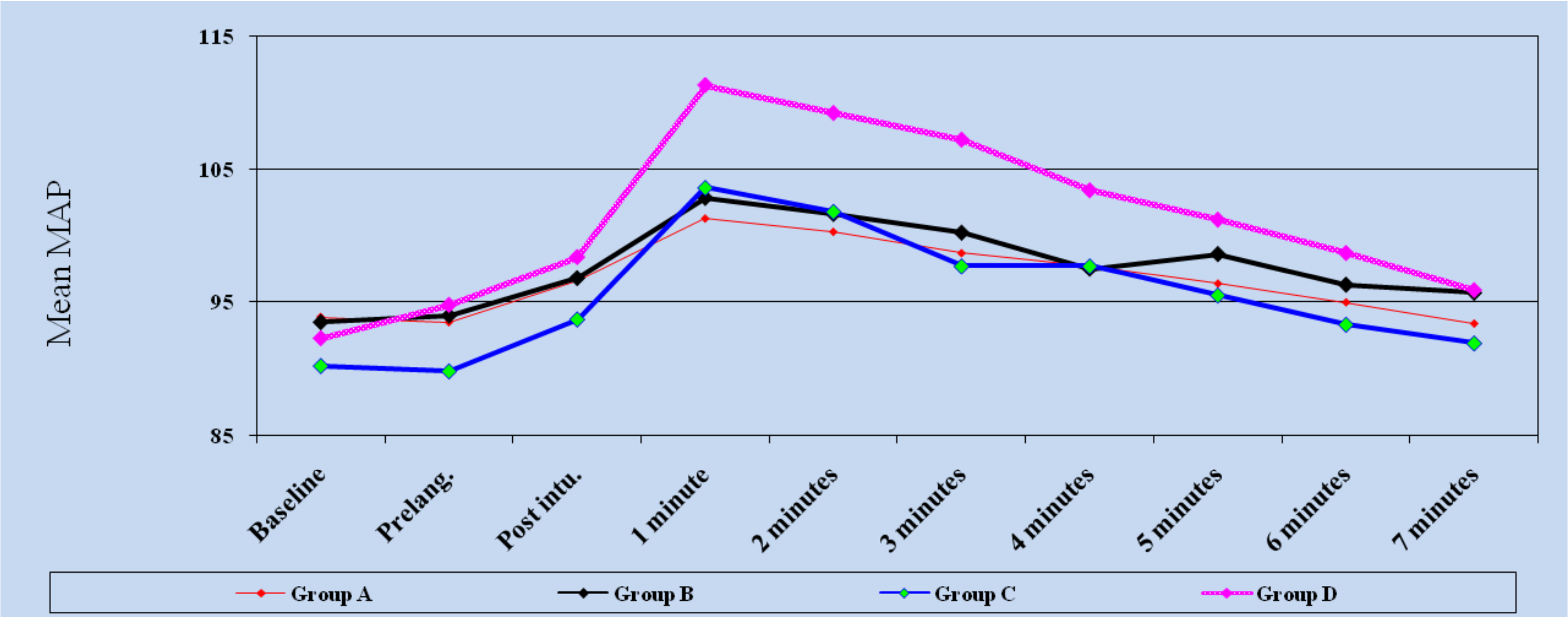


HEART RATE

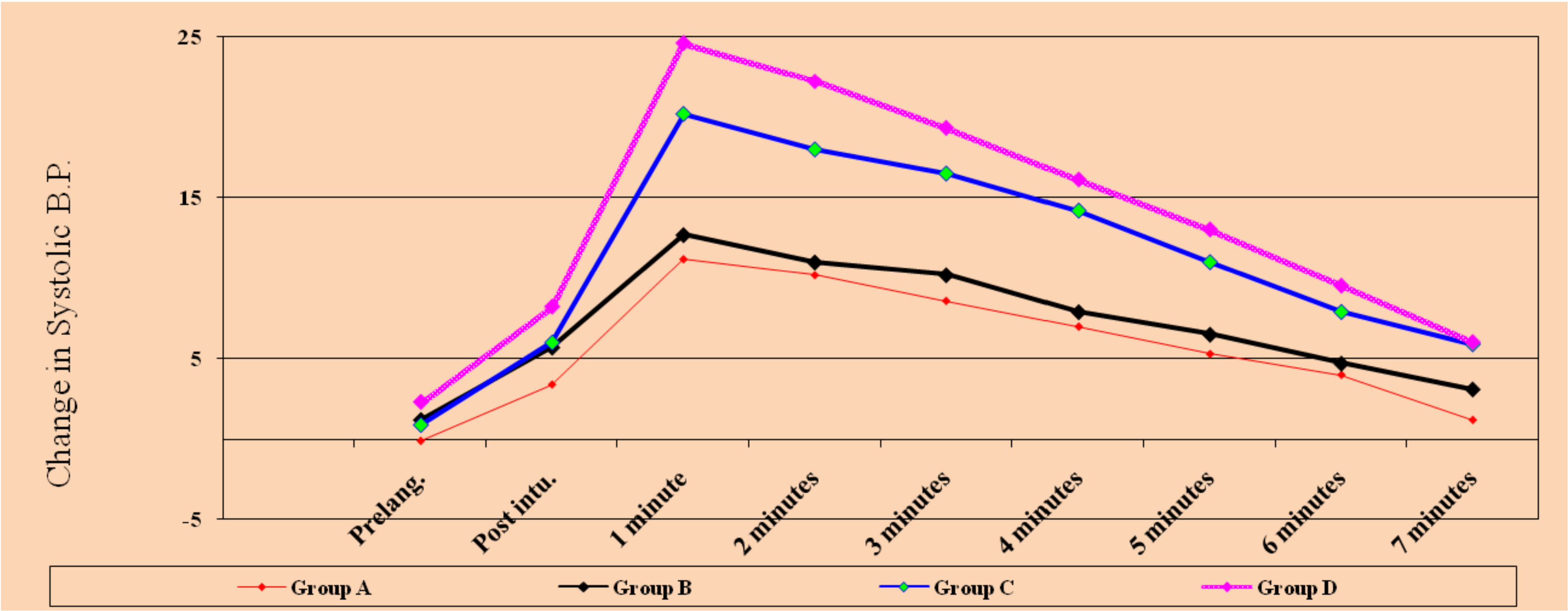


Mean Heart Rate
100
90
80
70
Baseline
Prelang.
Post intu.
1 minute
2 minutes
3 minutes
4 minutes
5 minutes
6 minutes
7 minutes
Group A
Group B
Group C
Group D

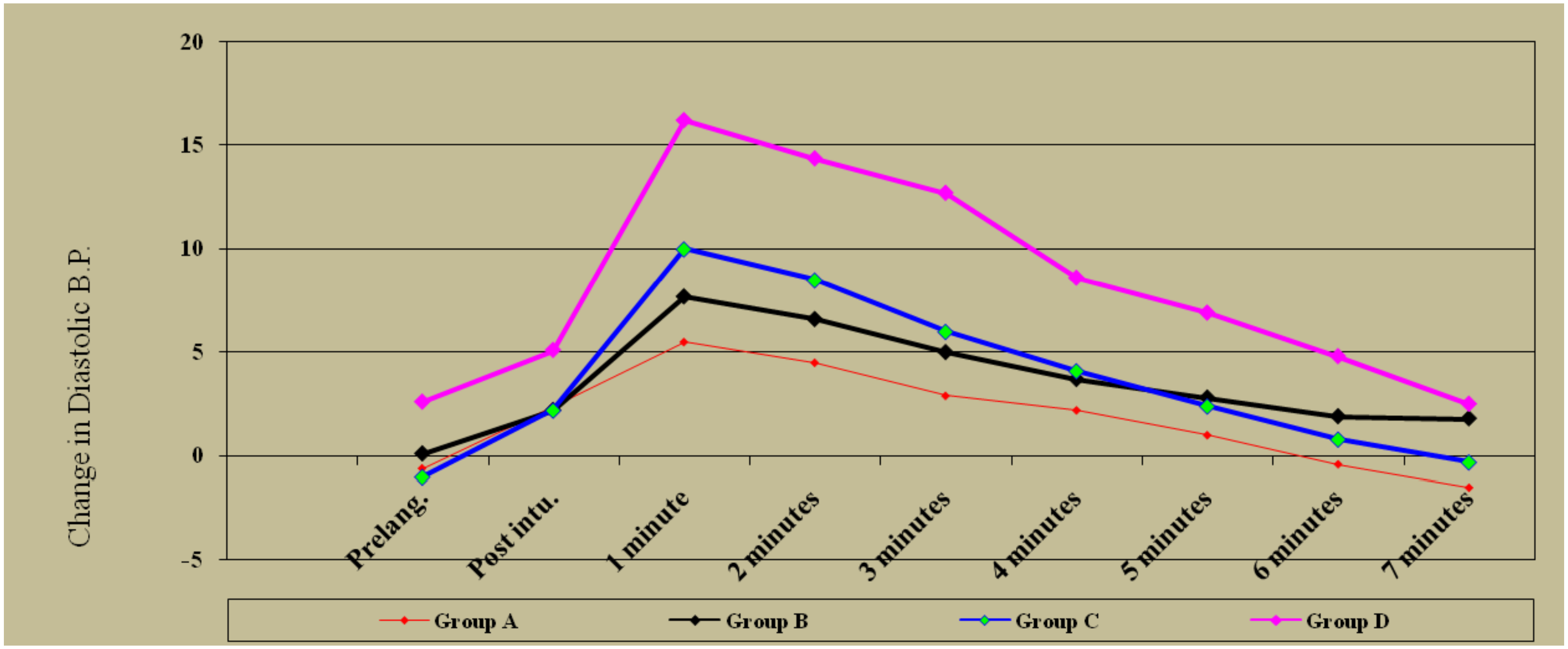
MEAN ARTERIAL PRESSURE



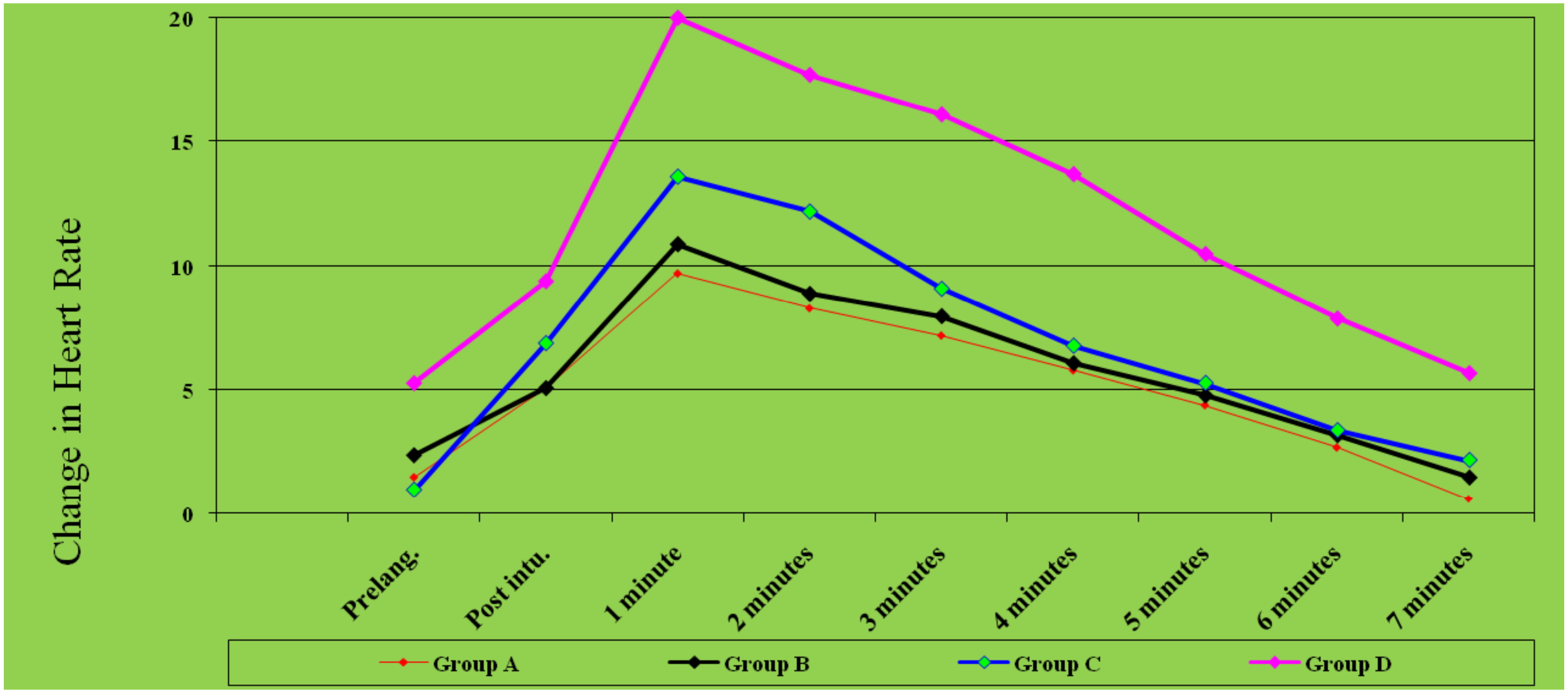
CHANGES IN SYSTOLIC B.P.



CHANGES IN DIASTOLIC B.P.



CHANGES IN HEART RATE



CHANGES IN MEAN ARTERIAL PRESSURE